

REMARKS

Applicants acknowledge receipt of an Office Action dated August 16, 2006. Claims 1-7 are currently pending in the application.

Reconsideration of the present application is respectfully requested in view of the remarks which follow.

Rejections Under 35 U.S.C. §103 - Dam

On page 2 of the Office Action, the PTO has rejected claims 1-7 under 35 U.S.C. §103(a) as allegedly being obvious over U.S. Patent 6,715,693 to Dam *et al.* (hereafter “Dam”). In addition, on page 3 of the Office Action, the PTO has rejected claims 2-7 under 35 U.S.C. §103(a) as allegedly being unpatentable over Dam in view of U.S. Patent 6,514,298 to Haji *et al.* (hereafter “Haji”). Applicants respectfully traverse these rejections for the reason set forth below.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, prior art references must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicants’ disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

Here, Applicants submit that Dam and Haji, whether taken individually or in combination, fail to teach or suggest “a surface roughness (R_y) (μm) which satisfies a relationship represented by the following formula (A): $R_y < (0.75 - Hk/8000) \times h + 0.0875$ (A)” as recited in claim 1. In fact, Dam fails to disclose any values for the surface roughness R_y of a hard carbon coating.

Applicants note that the range of claimed surface roughnesses defined by relationship “(A)” are not the “automatic” result of forming a film having a surface hardness (Hk) and thickness (h) within the presently claimed ranges as suggested by the PTO, *i.e.* the hardness and thickness of a film are not the sole determinants of the film’s surface roughness.

Even if they were, such a conflation of the concepts of *inherency* and *obviousness* is improper and cannot provide the bases for a proper obviousness rejection.

The only references to surface roughness in Dam appear at col. 1, line 67-col. 2, line 5 and at col. 7, ll. 1-7, and both of these very general references appear to relate only to the surface roughness of uncoated materials.

In the "Response to Arguments" section on page 5 of the Office Action, the PTO has suggested:

(i) that Dam discloses values for surface hardness (Hk) and film thickness (h) that fall within or overlap the presently claimed ranges and

(ii) that, as a result, Dam must also disclose the claimed values for Ry because the formula in claim 1 includes only 3 variables.

Applicants respectfully disagree. The conclusion in (ii) is based upon the incorrect presumption that the presently claimed formula is a mathematical equation. In a mathematical equation with 3 variables, it is easily possible to calculate the value for a third variable if the values for the other 2 variables are known. For example, in the equation: $A + B = C$, if $A = 2$ and $B = 3$, then the value for C must be 5.

Here, knowledge of values for 2 of the variables in the formula does not automatically result in knowledge of the values for the third variable, *i.e.* it is possible to produce films having surface hardness (Hk) and thickness (h) values which fall within the claimed range but with a surface roughness that falls outside the relationship defined by the formula (A) set forth in claim 1. This is due to the presence of the mathematical symbol "<" in the formula instead of the symbol "=", *i.e.* the formula is an inequality rather than an equation. Moreover, the formula in claim 1 was defined by the present inventors and appears nowhere in any of the cited references.

Haji adds nothing to resolve these fundamental deficiencies in Dam. Thus, Applicants believe that the Examiner's rejections based upon Dam and Haji are improper and should be withdrawn.

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the outstanding rejections under §103 based upon Dam.

Rejections Under 35 U.S.C. §103 - Coffinberry

On page 3 of the Office Action, the PTO has rejected claims 1-7 under 35 U.S.C. §103(a) as allegedly being obvious over U.S. Patent 6,156,439 to Coffinberry (hereafter "Coffinberry"). In addition, on page 4 of the office Action, the PTO has rejected claims 2-7 under 35 U.S.C. §103(a) as allegedly being unpatentable over Coffinberry in view of Haji. Applicants respectfully traverse these rejections for the reason set forth below.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, prior art references must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicants' disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

Here, Applicants submit that Coffinberry and Haji, whether taken individually or in combination, fail to teach or suggest "hard carbon thin film having a surface hardness ranging from 1500 to 4500 kg/mm² in Knoop hardness" as recited in claim 1. More Specifically, Applicants note that Coffinberry fails to disclose any values for surface hardness (Hk), and certainly fails to disclose the presently claimed range. Further, the claimed range for surface hardness (Hk) is not the "automatic" result of forming a film having a surface roughness (Ry) and thickness (h) that fall within the claimed formula, as suggested by the PTO..

As with the rejections based upon Dam, the PTO has taken the position that knowledge of 2 variables (here surface roughness and film thickness) automatically results in knowledge of the third variable (surface hardness). This is the same flawed reasoning as was applied in the rejections based upon Dam.

Applicants also note that the cover of the Coffinberry patent indicates that it is assigned to General Electric Company and that the disclosure appears to focus on problems caused by buildup of coke and gum on walls within jet and gas turbine engines. (See col. 2, line 65-col. 3, line 18). Although there is a passing reference to a fuel injector (See col. 3, line 14), there is no discussion of coating sliding structures within the fuel injectors or solving the problems addressed in the present patent application. The remainder of Coffinberry's

disclosure discusses coatings on walls. (See col. 5, lines 13-25). Thus, Applicants submit that Coffinberry also fails to disclose “a hard carbon thin film coated on at least one of the sliding sections of the base materials of the needle valve and the opposite member” as recited in claim 1.

Haji adds nothing to resolve these basic deficiencies in Coffinberry.

As a result, Applicants believe that the Examiner's rejections based upon Coffinberry and Haji are improper and should be withdrawn.

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the outstanding rejections under §103 based upon Dam.

CONCLUSION


Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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By 

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